

# Review of the genus *Apotrechus* in China (Orthoptera, Gryllacrididae, Gryllacridinae)

Miao-Miao Li<sup>1,2</sup>, Xian-Wei Liu<sup>2</sup>, Kai Li<sup>1</sup>

**1** School of Life Science, East China Normal University, Shanghai 200241, China **2** Shanghai Entomology Museum, Chinese Academy of Sciences, Shanghai 200032, China

Corresponding authors: Kai Li ([kaili@admin.ecnu.edu.cn](mailto:kaili@admin.ecnu.edu.cn)); Xian-Wei Liu ([liuxianwei2008@163.com](mailto:liuxianwei2008@163.com))

---

Academic editor: David Eades | Received 8 October 2014 | Accepted 28 January 2015 | Published 16 February 2015

---

<http://zoobank.org/01D7EF6F-8540-43CE-A290-49265FCAE605>

---

**Citation:** Li M-M, Liu X-W, Li K (2015) Review of the genus *Apotrechus* in China (Orthoptera, Gryllacrididae, Gryllacridinae). ZooKeys 482: 143–155. doi: 10.3897/zookeys.482.8713

---

## Abstract

In the present paper, the genus *Apotrechus* Brunner-Wattenwyl, 1888 is revised. Two new species from China are described and illustrated: *Apotrechus quadratus* sp. n. and *Apotrechus truncatolobus* sp. n.. A new key and the distributional data are given.

## Keywords

Gryllacrididae, Gryllacridinae, *Apotrechus*, new species, China

## Introduction

The genus *Apotrechus* was proposed by Brunner-Wattenwyl (1888), with the type species *Apotrechus unicolor* Brunner-Wattenwyl, 1888. This genus resembles the genus *Eremus* Brunner-Wattenwyl, 1888, but differs from the latter in: smooth frons, spineless hind tibia and absence of male styli. Liu and Yin (2002) first studied *Apotrechus* in China, described one new species *A. nigrigeniculatus*. Liu and Bi (2008) gave a key of *Apotrechus* from China containing three species, and two new species *A. digitatus* and *A. fallax* were illustrated. Besides, Liu et al. (2010) also reported one new species

*A. transversus* from Zhejiang. Subsequently, Guo and Shi (2012) reviewed this genus of China and also provided a key containing six species in China which included one new species *A. bilobus*, and one new combination *A. parvospinus*.

Bian et al. (2014) provided a key to the species with one new species *A. trilobus* and the morphological photographs for five Chinese known species in this paper.

So far, the genus *Apotrechus* includes nine species in the world, among them, *A. unicolor* Brunner-Wattenwyl, 1888, *A. swinhoei* (Griffini, 1909), and *A. illawarra* Rentz, 1990 are recorded in Australia; *A. insolitus* (Walker, 1869) is distributed in Vietnam and others are recorded in China. In this paper, two new species of *Apotrechus* are identified and described, namely *Apotrechus quadratus* sp. n. and *A. truncatolobus* sp. n., which are distributed in Guangxi.

## Material and methods

All specimens of the genus were collected by light-trapping and net-catching from China. Adult specimens were preserved in 70% ethanol in the field, then removed and dried in the lab. The specimens were observed with the help of a Leica MZ 12.5 dissecting microscope and illustrated with the aid of a drawing tube attached to the microscope. Line drawings were made with Adobe Illustrator CS 6 graphic software. The length of the body was measured mesally by the distance between apex of fastigium verticis and posterior margin of tenth abdominal tergite, ovipositor by distance between base of subgenital plate and apex of ovipositor; pronotum, tegmina and hind femora by distance between summit of base and apex. All lengths are presented in millimeters. The venation nomenclature used in this paper is based on the interpretation of Karny (1937). All type specimens recorded here are deposited in the Shanghai Entomology Museum, the Chinese Academy of Sciences.

## Taxonomy

### Genus *Apotrechus* Brunner-Wattenwyl, 1888

urn:lsid:orthoptera.speciesfile.org:TaxonName:21786

*Apotrechus*: Brunner-Wattenwyl 1888: 383; Tepper 1892: 167; Kirby 1906: 152; Ramme 1933: 416; Karny 1937: 82; Rentz and John 1990: 1083; Liu and Bi 2008: 11, figs 1–5; Liu et al. 2010: 64; Guo and Shi 2012: 52.

**Type species.** *Apotrechus unicolor* Brunner-Wattenwyl, 1888.

**Generic diagnosis.** Body small, wings absent. Fastigium of vertex rather wider than scape, without lateral carinae; frons smooth, ocelli inconspicuous. Fore and mid tibiae with 4–5 pairs of spurs on ventral surface, mid tibia without inner upper apical spur on dorsal surface. Hind tibia armless or with rather small spine on ventral surface. Subgenital plate of male without styli. Ovipositor rather short, upcurved.

**Key to the Chinese species of the genus *Apotrechus***

- 1 Fore and mid femora with black apical part ..... 2
- Fore and mid femora without black apical part ..... 5
- 2 External margin of hind femur without spine; lobes of male subgenital plate with acute apex ..... *A. trilobus* **Bian & Shi, 2014**
- External margin of hind femur with spines ..... 3
- 3 Body smaller, about 14–18 mm long ..... 4
- Body larger, about 23 mm long; hind margin of female subgenital plate slightly concave ..... *A. quadratus* **sp. n.**
- 4 Male 9<sup>th</sup> abdominal tergite deeply excised; hind margin of female subgenital plate truncated ..... *A. nigrigeniculatus* **Liu & Yin, 2002**
- Male 9<sup>th</sup> abdominal tergite shallowly excised; hind margin of female subgenital plate rounded ..... *A. fallax* **Liu & Bi, 2008**
- 5 Frons without blackish longitudinal stripe; lobes of male 9<sup>th</sup> abdominal tergite with roundly truncate apex ..... *A. truncatolobus* **sp. n.**
- Frons with 2–3 blackish longitudinal stripes; lobes of male 9<sup>th</sup> abdominal tergite with acute apex ..... 6
- 6 Frons smooth ..... 7
- Frons sunken; dorsal side of hind tibia armed with 3 external and 2 internal spines ..... *A. parvospinus* **(Liu & Yin, 2002)**
- 7 Frons with 2 blackish longitudinal stripes; male subgenital plate with incurved lobes; female subgenital plate a bit broader than long ..... 8
- Frons with 3 blackish longitudinal stripes; male subgenital plate with straight lobes; female subgenital plate transverse, ovipositor with lateral lobes at base.. ..... *A. transversus* **Liu et al., 2010**
- 8 Lobes of male subgenital plate with finger-shaped apex; ovipositor without lateral lobes at base ..... *A. digitatus* **Liu & Bi, 2008**
- Lobes of male subgenital plate with broadly rounded apex; ovipositor with lateral lobes at base ..... *A. bilobus* **Guo & Shi, 2012**

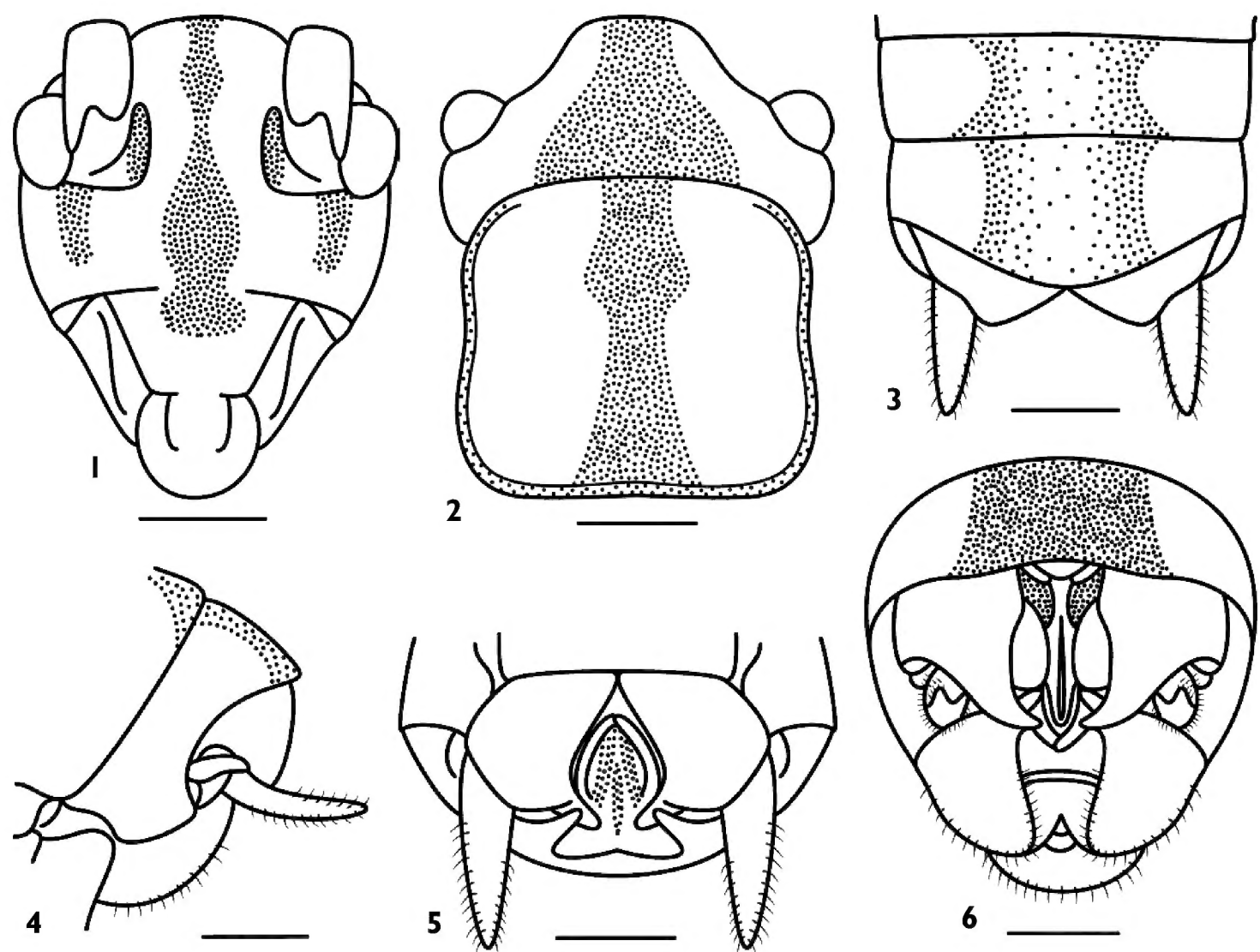
**1. *Apotrechus trilobus* **Bian & Shi, 2014****

<http://zoobank.org/4DA1028E-49F8-4F99-A0ED-F632A4BFC4C3>

Figs 1–6

*Apotrechus trilobus*: **Bian et al. 2014: 384–386.**

**Description.** Male. Body medium sized. Wings absent. Fastigium of vertex rounded, about 2 times as wide as scape; eyes reniform, prominent; ocelli inconspicuous. Pronotum almost hexagon, paranota lower. Fore coxa with a spine, fore tibia on ventral surface with 5 pairs of spurs (included 1 pair of apical spurs); mid tibia without inner upper apical spur but with 4 pairs of spurs (included 1 pair of apical spurs) on ventral surface. Ventral



**Figures 1–6.** *Apotrechus trilobus* Bian & Shi, 2014. **1** head in frontal view **2** head and pronotum in dorsal view **3** end of male abdomen in dorsal view **4** end of male abdomen in lateral view **5** end of male abdomen in ventral view **6** end of male abdomen in caudal view. Scale: 1 mm.

surface of hind femur with 10–11 internal spines, but without external spine, hind tibia unarmed or with 1–2 minute spines on dorsal surface, bearing 3 pairs of apical spurs. 9<sup>th</sup> abdominal tergite divided into two lobes, which bearing spine-like apex pointing downwards, epiproct medially furrowed (Fig. 5). Cerci shorter, conical; subgenital plate broad, hind margin split into two lobes, apex of lobes spine-like, curved inside (Fig. 6).

Female. Unknown.

**Coloration.** Body infusate. Fastigium of vertex with darkish black longitudinal band; frons with 3 blackish longitudinal stripes, middle stripe broad, not connected with the longitudinal band of fastigium of vertex (Figs 1–2); inner margin of antenna foveolae and first segment with blackish spots. Pronotum with a darkish black longitudinal band in the middle and all margins black. Apex of fore and middle femora black, hind femur with a blackish longitudinal stripe on external surface, all tibiae darkish black on the base and apex.

**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	16.0	3.8	10.0	–

**Material.** 1♂, Yunnan, Pingbian, Yuping, 2000m, 20.V.2009, Xian-Wei Liu et al. leg.

**Distribution.** China: Yunnan.

**2. *Apotrechus quadratus* Li & Liu, sp. n.**

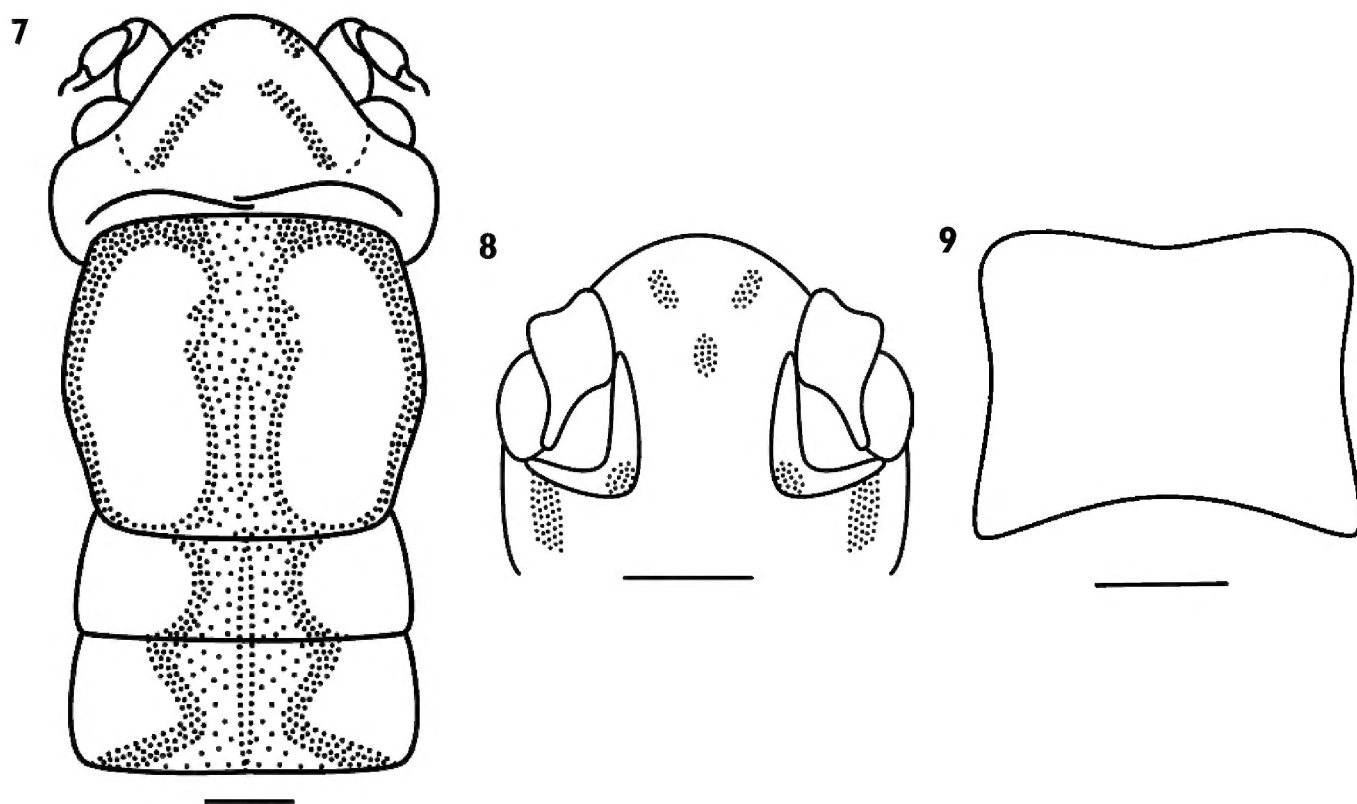
<http://zoobank.org/F5255058-CCB5-4734-9157-89E36EB98A9E>

Figs 7–9

**Description.** Female. Body large. Wings apterous. Fastigium of vertex roundly projected, about 2 times as wide as scape; eyes reniform, produced; ocelli faintly. Pronotum almost hexagon, lateral lobes longer than high. Fore coxa with a spine, fore tibia on ventral surface with 5 pairs of spurs (included 1 pair of apical spurs) but without inner upper apical spur; mid tibia on ventral surface with 4 pairs of spurs (included 1 pair of apical spurs). Hind femur on ventral surface armed 8 internal spines and 1–3 external spines; hind tibia on dorsal surface bearing 6 pairs of rather small spines and 2 pairs of apical spurs. Cerci shorter, conical; subgenital plate broad, square, and hind margin slightly concave (Fig. 9). Ovipositor short, curved upwards, apex blunt.

Male. Unknown.

**Coloration.** Body yellowish brown. Fastigium of vertex with 2 pairs of darkish black longitudinal bands; frons with 3 blackish longitudinal spots; inner margin of basal antenna and first segment with blackish spots. Lateral and fore margin of pronotum black, in the middle with a darkish black vertical stripe. Mesonotum and metanotum also with a black spot at middle parts (Figs 7–8). Hind femur with a blackish longitudinal stripe on external surface, all tibiae on base and apex darkish black.



**Figures 7–9.** *Apotrechus quadratus* sp. n. **7** head and pronotum in dorsal view **8** frons in front view **9** subgenital plate of female in ventral view. Scale: 1 mm.

**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♀	23.0	4.8	10.5	5.5

**Material.** Holotype ♀, Guangxi, Xing'an, Maoer Mountain, 1700–2100m, 30.VII–6.VIII. 2013, Xian-Wei Liu et al. leg.

**Distribution.** China: Guangxi.

**Diagnosis.** This new species is closely related to *A. nigrigeniculatus* Liu & Yin, 2002, but differs mainly in the the latter in body larger and subgenital plate of female with hind margin slightly concave.

**Etymology.** The specific epithet referrers to shape of female subgenital plate.

**3. *Apotrechus nigrigeniculatus* Liu & Yin, 2002**

urn:lsid:orthoptera.speciesfile.org:TaxonName:21789

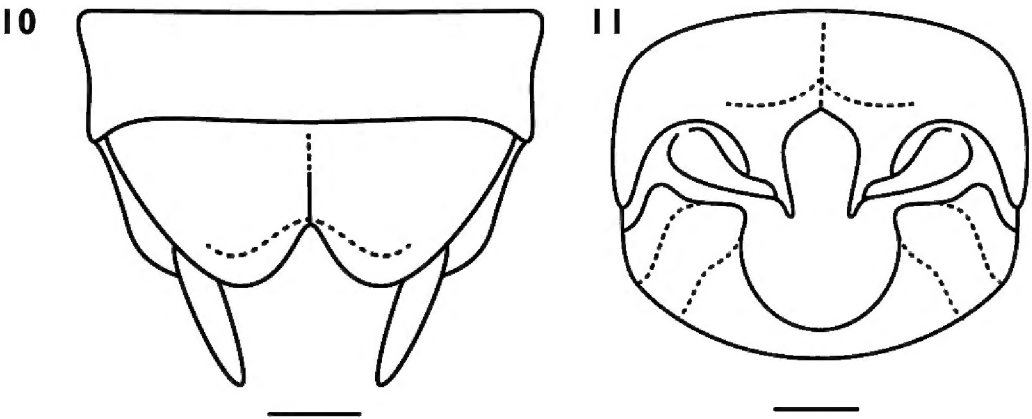
Figs 10–11

*Apotrechus nigrigeniculatus*: Liu and Yin 2002: 418; Guo and Shi 2012: 53; Bian et al. 2014: 383.

**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	15.0–16.5	3.5	9.0–10.0	–
♀	14.0	3.7	7.5	5.0

**Material.** 2♂♂, Sichuan, Emei Mountain, 1840m, 16.VIII.1985, Gen-Tao Jin leg..  
**Distribution.** China: Sichuan.



**Figures 10–11.** *Apotrechus nigrigeniculatus* Liu & Yin, 2002. **10** end of male abdomen in dorsal view **11** end of male abdomen in caudal view. Scale: 1 mm.



4. *Apotrechus fallax* Liu & Bi, 2008  
urn:lsid:orthoptera.speciesfile.org:TaxonName:21787  
Figs 12–16

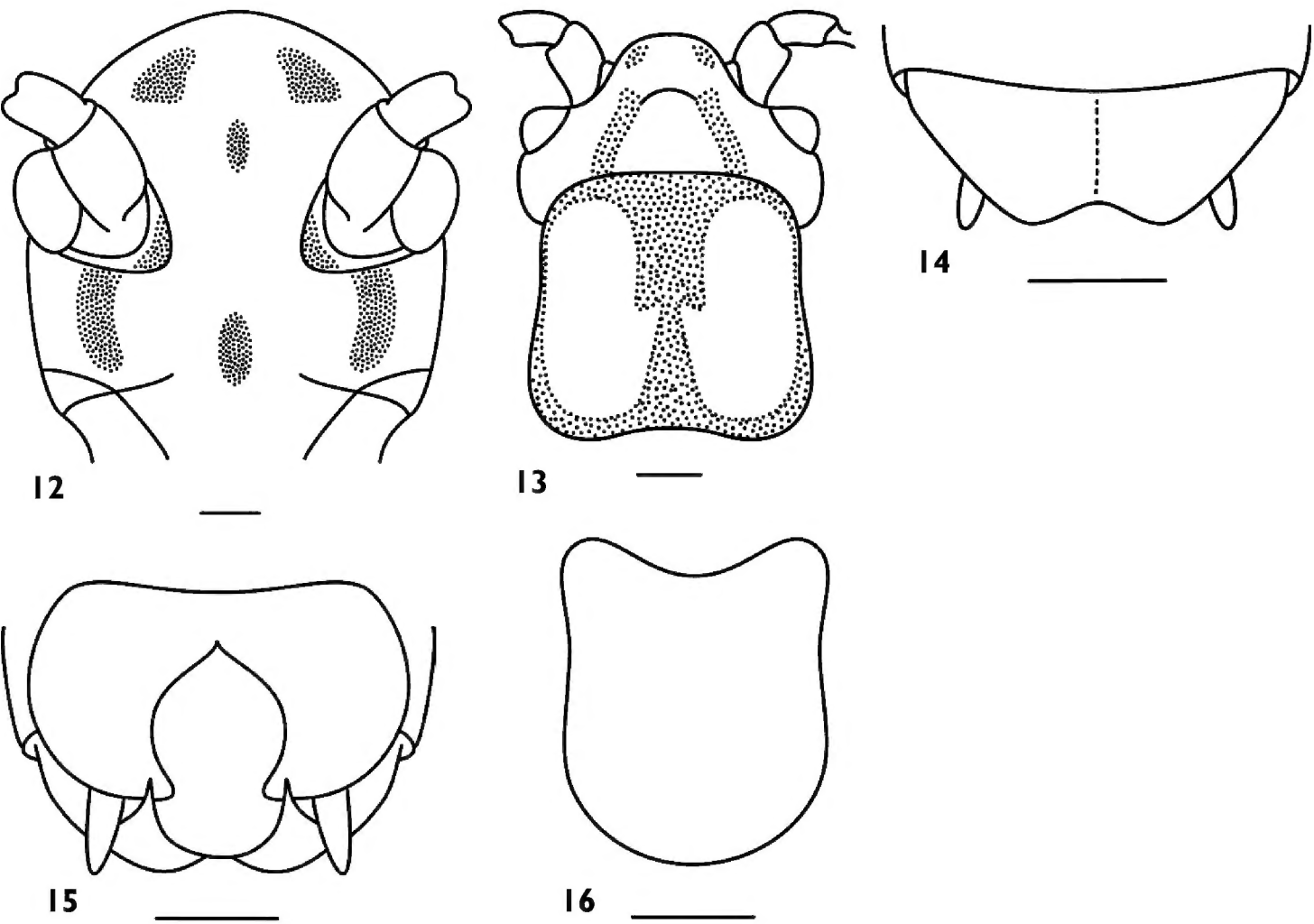
*Apotrechus fallax*: Liu and Bi 2008: 13, figs 1–5; Guo and Shi 2012: 53; Bian et al. 2014: 382.

Measurements. (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	14.0	3.8	8.0	–
♀	18.0	3.8	8.0	5.5

**Material.** 1♀, Guizhou, Leigongshan, 1620–2178m, 2.VIII.2004, Pian Xu leg.; 1♂, Guizhou, Leigong Mountain, 1000–1100m, 2–3.VI.2005, Zheng-Guang Zhang leg.; 2♂♂, Guizhou, Jiangkou, Fanjingshan, 1200–1800m, 6.VIII.2014, Miao-Miao Li & Mei-Ling Sun leg..

**Distribution.** China: Guizhou.



**Figures 12–16.** *Apotrechus fallax* Liu & Bi, 2008. **12** head in frontal view **13** head and pronotum in dorsal view **14** end of male abdomen in dorsal view **15** end of male abdomen in ventral view **16** subgenital plate of female in ventral view. Scale: 1 mm.

### 5. *Apotrechus truncatolobus* Li & Liu, sp. n.

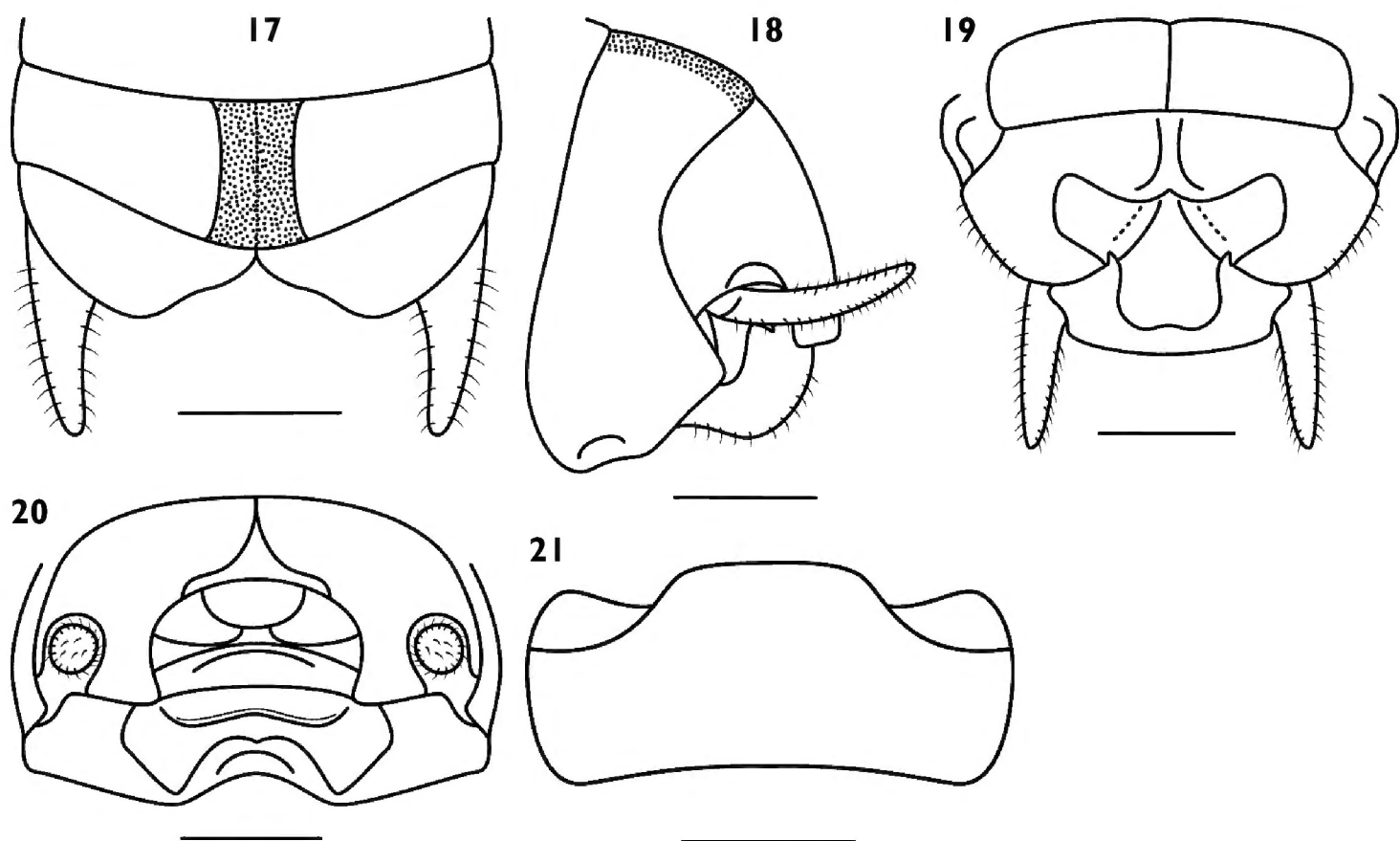
<http://zoobank.org/76C1D15F-B014-454D-855A-365A94B4E267>

Figs 17–21

**Description.** Male. Body medium sized. Wings absent. Fastigium of vertex rounded, about 2 times as wide as scape; eyes ovoid, prominent, ocelli inconspicuous. Cephalic margin of pronotum slightly projected, posterior margin slightly truncated, lateral lobes lower. Fore coxa with a spine, fore tibia on ventral surface with 5 pairs of spurs (included 1 pair of apical spurs); mid tibia without inner upper apical spur but on ventral surface with 4 pairs of spurs (included 1 pair of apical spurs); hind tibia without spine or on dorsal surface with 1–2 minute spines, with 3 pairs of apical spurs. Hind femur with 10–12 internal spines and 7–8 external spines on ventral surface. Lobes of 9<sup>th</sup> abdominal tergite with roundly truncated apex (Fig. 20); cerci shorter, conical; subgenital plate broad, hind margin split into two lobes and with notch in the middle (Figs 18–19).

Female. Cerci short, conical; subgenital plate strongly transverse, with straight hind margin and rounded posterio-lateral corner (Fig. 21). Ovipositor shorter than hind tibia, upcurved and with blunt apex.

**Coloration.** Body yellowish brown, occiput slightly with darkish black. Frons without blackish longitudinal stripes; dorsal margin of abdominal with a darkish black longitudinal band in the middle (Fig. 17). Apex of fore femur, base and apex of tibiae slightly darkish black.



**Figures 17–21.** *Apotrechus truncatolobus* sp. n. **17** end of male abdomen in dorsal view **18** end of male abdomen in lateral view **19** end of male abdomen in ventral view **20** end of male abdomen in caudal view **21** subgenital plate of female in ventral view. Scale: 1 mm.



**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	16.0	3.5	9.0	–
♀	18.0	3.8	9.0	6.0

**Material.** Holotype ♂, paratype 1♂1♀, Guangxi, Wuming, Daming Mountain, 1200m, 28–31.VII.2012, Wen-Xuan Bi leg.

**Distribution.** China: Guangxi.

**Diagnosis.** This new species almost the same as its congeners, but the frons without blackish longitudinal stripe; lobes of male 9<sup>th</sup> abdominal tergite with roundly truncate apex.

**Etymology.** The specific epithet refers roundly truncate lobes of male 9<sup>th</sup> abdominal tergite.

**6. *Apotrechus parvospinus* (Liu & Yin, 2002)**

urn:lsid:orthoptera.speciesfile.org:TaxonName:73813

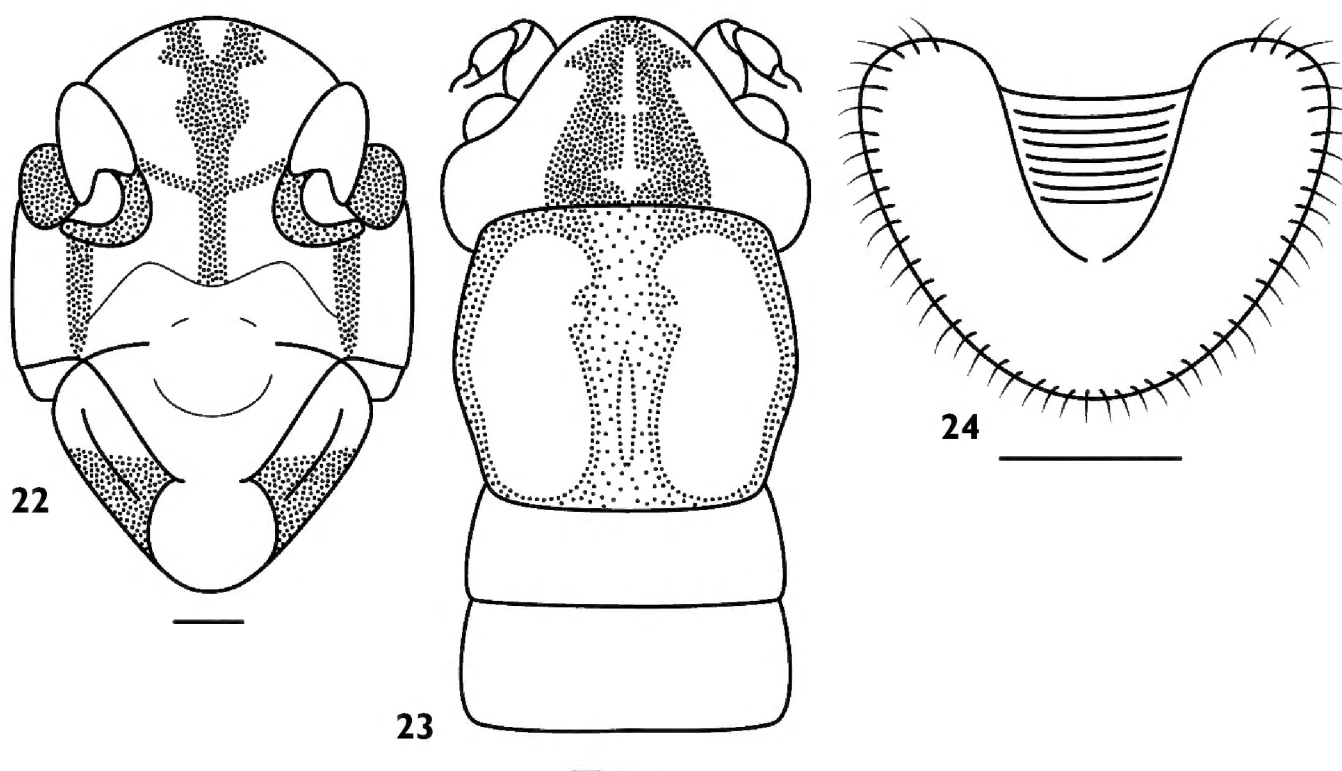
Figs 22–24

*Eremus parvospinus*: Liu and Yin 2002: 417.

*Apotrechus parvospinus*: Guo and Shi 2012: 53; Bian et al. 2014: 384.

**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	20.0	3.7	8.6	–
♀	20.0	4.0	9.5	5.0



**Figures 22–24.** *Apotrechus parvospinus* (Liu & Yin, 2002). **22** head in frontal view **23** head and pronotum in dorsal view **24** subgenital plate of female in ventral view. Scale: 1 mm.

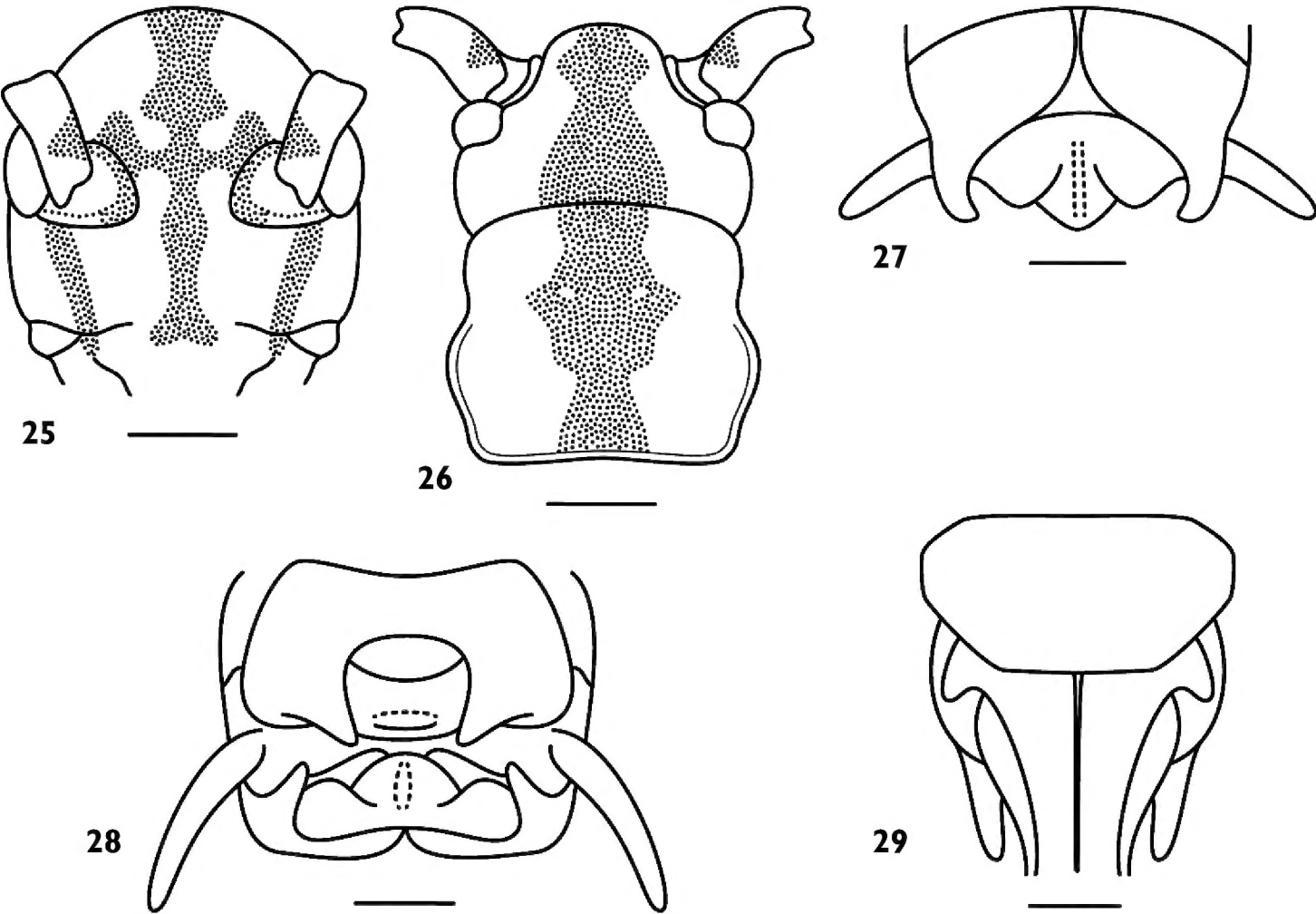
**Material.** 1♀, Guangxi, Xing'an, Maoer Mountain, 1000m, 22–23.VIII.1992, Xian-Wei Liu & Hai-Sheng Yin leg..  
**Distribution.** China: Guangxi.

**7. *Apotrechus transversus* Liu et al., 2010**  
urn:lsid:orthoptera.speciesfile.org:TaxonName:73811  
Figs 25–29

*Apotrechus transversus*: Liu et al. 2010: 65, figs 8a–c; Guo and Shi 2012: 53; Bian et al. 2014: 384.

**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	14.0	3.0	7.0	–
♀	19.0–20.0	3.5–3.8	7.5–8.0	5.0–6.0



**Figures 25–29.** *Apotrechus transversus* Liu et al., 2010. **25** head in frontal view **26** head and pronotum in dorsal view **27** end of male abdomen in dorsal view **28** end of male abdomen in caudal view **29** end of female abdomen in ventral view. Scale: 1 mm.

**Material.** 1♂1♀, Zhejiang, Longquan, Fengyanshan, 1400m, 27.VII.2007, Qiang Fu leg.; 2♀♀, Zhejiang, Longquan, Fengyanshan, Huangmaojian, 1500–1900m, 31.VII–2.VIII.2008, Xian-Wei Liu & Wen-Xuan Bi.

**Distribution.** China: Zhejiang.

**8. *Apotrechus digitatus* Liu & Bi, 2008**

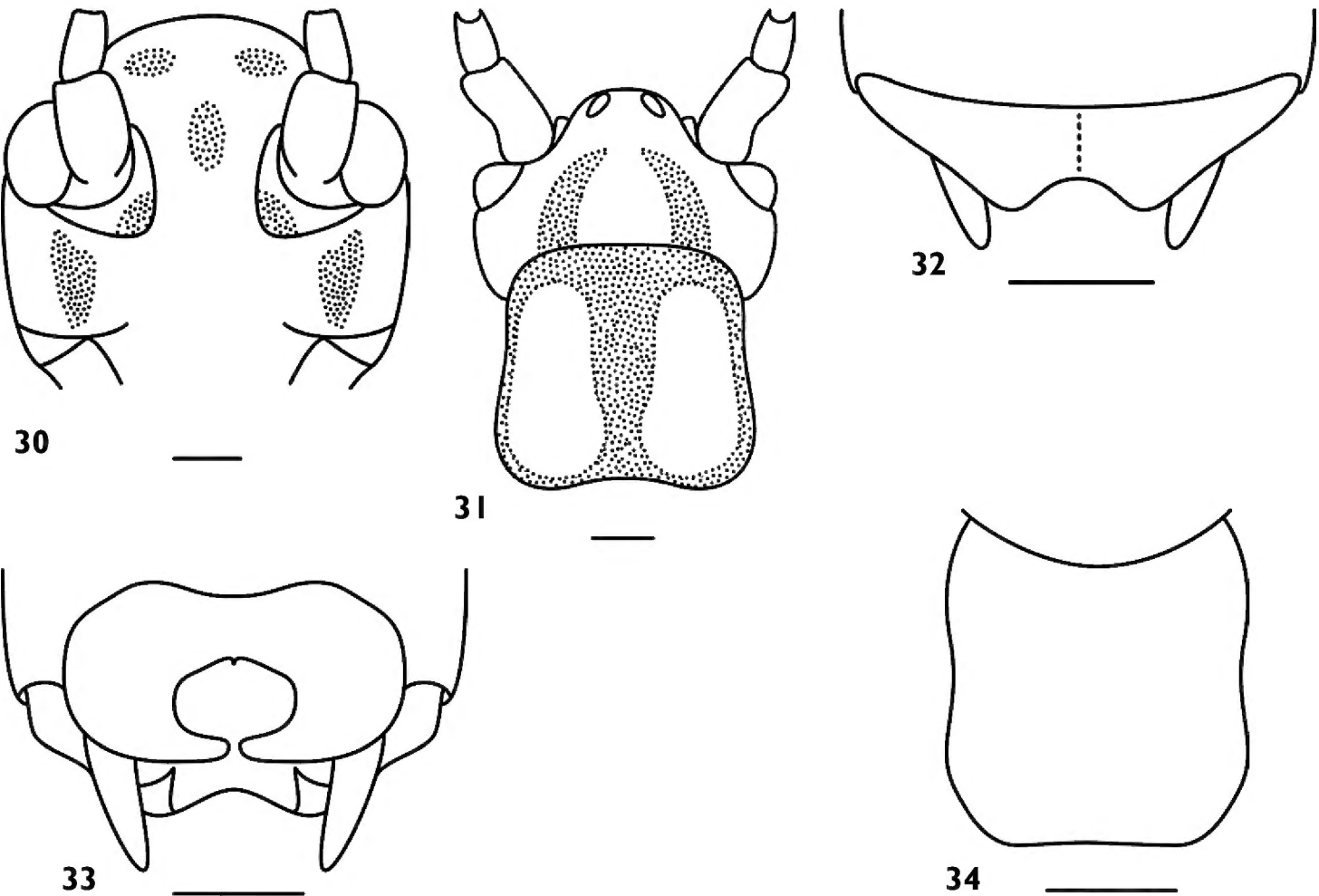
urn:lsid:orthoptera.speciesfile.org:TaxonName:21788

Figs 30–34

*Apotrechus digitatus*: Liu and Bi 2008: 12, figs 1–5; Guo and Shi 2012: 53; Bian et al. 2014: 381.

**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	15.0	4.0	9.0	–
♀	19.0	4.5	9.0	5.5



**Figures 30–34.** *Apotrechus digitatus* Liu & Bi, 2008. **30** head in frontal view **31** head and pronotum in dorsal view **32** end of male abdomen in dorsal view **33** end of male abdomen in ventral view **34** subgenital plate of female in ventral view. Scale: 1 mm.

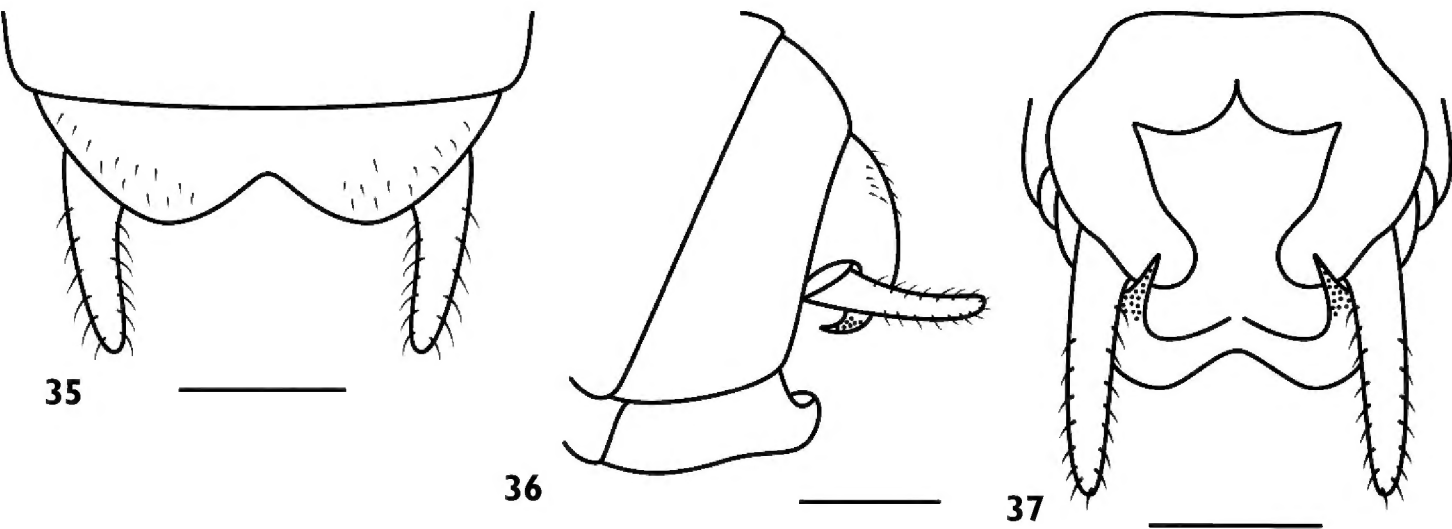
**Material.** 1♀1♂, Guizhou, Leigong Mountain, 1620–2178m, 2.VIII.2004, Kai Yan & De-Yan Ge leg.  
**Distribution.** China: Guizhou.

**9. *Apotrechus bilobus* Guo & Shi, 2012**  
urn:lsid:orthoptera.speciesfile.org:TaxonName:73812  
Figs 35–37

*Apotrechus bilobus*: Guo and Shi 2012: 55, figs 1–5, 12–13, 17–18; Bian et al. 2014: 380–381.

**Measurements.** (length in mm)

	Body	Pronotum	Hind femur	Ovipositor
♂	15.0–17.5	3.5	8.0–9.5	–
♀	20.0–22.0	4.0–4.2	9.0	4.7–5.0



**Figures 35–37.** *Apotrechus bilobus* Guo & Shi, 2012. **35** end of male abdomen in dorsal view **36** end of male abdomen in lateral view **37** end of male abdomen in ventral view. Scale: 1 mm.

**Material.** 1♂, Zhejiang, Lin'an, Xitianmu Mountain, 1140m, 28.VII–2.IX.2010, Hui Pan leg.  
**Distribution.** China: Zhejiang.

**Acknowledgements**

We thank Han-Qiang Wang & Li Dai for their help with the manuscript; we are grateful to all collectors of the specimens recorded in this paper. This research was supported by the Natural Science Foundation of Shanghai, China (No. 14ZR1413000), The Ministry of Science and Technology of the People's Republic of China (Grant No. 2005DKA21402) and Chinese Academy of Sciences (Grant No. XXH12504-1-03).

## References

- Bian X, Wang S-Y, Shi F-M (2014) One new species of the Genus *Apotrechus* (Orthoptera: Gryllacrididae), with provided morphological photographs for five Chinese species. *Zootaxa* 3884(4): 379–386. doi: 10.11646/zootaxa.3884.4.7
- Brunner von Wattenwyl C (1888) Monographie der Stenopelmatiden und Gryllacriden. *Verhandlungen der Zoologisch-botanischen in Wien* 38: 247–349.
- Eades DC, Otte D, Naskrecki P, Cigliano MM (2014) Orthoptera Species File Online (Version 5.0). <http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1130971> [accessed Mar. 2014]
- Griffini A (1909) Studi sui Grillacridi del Museo di Oxford. Parte Ia, specie etiopiche, indomalesi ed australiane. *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano* 47: 300–338.
- Guo L-Y, Shi F-M (2012) Notes on the genus *Apotrechus* (Orthoptera: Gryllacrididae: Gryllacridinae). *Zootaxa* 3177: 52–58.
- Karby HH (1937) Orthoptera fam. Gryllacrididae. *Gener Insectorum* 206: 82.
- Kirby WF (1906) A Synonymic Catalogue of Orthoptera. 2. British Museum (Natural History), London, 562 pp.
- Liu X-W, Yin H-S (2002) Two new species of Gryllacridinae from China (Orthoptera: Stenopelmatidae). *Zoological Research* 23(5): 417–418.
- Liu X-W, Bi W-X (2008) Two new species of the genus *Apotrechus* (Orthoptera: Stenopelmatidae: Gryllacrinae). *Entomotaxonomia* 30(1): 11–14.
- Liu X-W, Bi W-X, Zhang F (2010) Orthoptera: Stenopelmatoidea. In: Xu H-C, Ye T-X (Eds) *Insects of Fengyangshan National Nature Reserve*. China Forestry Publishing House, Beijing, 53–68.
- Rentz DCF, John B (1990) Studies in Australian Gryllacrididae: Taxonomy, biology, ecology and cytology. *Invertebrate Taxonomy* 3(8): 1053–1210. doi: 10.1071/IT9891053
- Walker F (1869) Catalogue of the specimens of Dermaptera Saltatoria and supplement to Blattariae in the Collection of the British Museum. British Museum (Natural History), London, 224 pp.